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In re application of:

HOLGER KUNSTLE ET AL.

Serial No.: 09/612,166

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Examiner: Jeff Aftergut TC 1700

For: LOW-EMISSION ADHESIVES BASED ON AN AQUEOUS,  
PROTECTIVE-COLLOID-FREE DISPERSIONS OF VINYL  
ACETATE-ETHYLENE COPOLYMERS

Attorney Docket No.: WAS 0431 PUS

**APPEAL BRIEF**

Mail Stop Appeal Brief - Patents  
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Sir:

Appellants appeal the final rejection of claims 1-19 of the Office Action dated June 9, 2003. A Notice of Appeal was filed on October 7, 2003.

**I. REAL PARTY IN INTEREST**

The real party in interest is Wacker-Chemie GmbH, by virtue of Assignment recorded at Reel 010928, Frame 0229.

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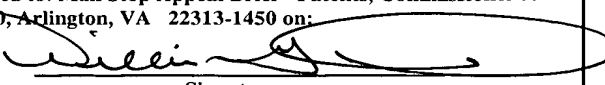
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## **II. RELATED APPEALS AND INTERFERENCES**

Appellants are unaware of any related appeals or interferences which will directly affect or be directly affected by or have a bearing on the Board's decision in the pending appeal.

## **III. STATUS OF CLAIMS**

Claims 1-19 are pending in this application. Appellants appeal the rejection of claims 1-19, all the claims.

## **IV. STATUS OF AMENDMENTS**

No claim amendments were presented following the Final Rejection dated June 9, 2003. Therefore, the claims are of the scope presented in Appellant's response dated May 7, 2003 (Certificate of Mailing date). A copy of the claims is appended hereto.

## **V. SUMMARY OF THE INVENTION**

The subject invention pertains to a low-emission adhesive comprising an aqueous, protective-colloid-free polymer dispersion or water-redispersible dispersion powder prepared therefrom, of vinyl ester-ethylene copolymers containing free carboxylic acid groups, by free-radically initiated emulsion polymerization, in aqueous medium and in the presence of at least one emulsifier, of a comonomer mixture comprising

- a) from 5 to 50% by weight of ethylene,
- b) from 20 to 80% by weight of at least one vinyl ester selected from the group consisting of vinyl esters of unbranched or branched carboxylic

acids having 1 to 9 carbon atoms whose homopolymers have a glass transition temperature  $T_g > 0^\circ\text{C}$ ,

- c) from 5 to 70% by weight of at least one vinyl ester selected from the group consisting of a vinyl ester of a branched carboxylic acids having 8 to 13 carbon atoms whose homopolymers have a glass transition temperature  $T_g < 0^\circ\text{C}$ ,
- d) from 0.5 to 10% by weight of at least one ethylenically unsaturated monocarboxylic or dicarboxylic acid having 3 or 4 carbon atoms,
- e) from 0 to 10% by weight of at least one ethylenically unsaturated, hydroxyalkyl-functional comonomer,
- f) from 0 to 10% by weight of a further mono- or polyethylenically unsaturated comonomer,

the % by weight being based in each case on the overall weight of the comonomers and adding up to 100% by weight, and the dispersion obtained therewith optionally being dried,

wherein said vinyl ester-ethylene copolymers are free of moieties derived from (meth)acrylate alkyl esters, (Summary of Invention, page 2, line 27 to page 3, line 18; claim 1 as filed, Examples and Comparative Examples) and wherein said copolymers have a glass transition temperature of between  $-60^\circ\text{C}$  and about  $-10^\circ\text{C}$  (page 5, lines 24-25).

## VI. ISSUES

The issues may be succinctly stated as follows:

Issue A: Are Japanese published application Sho 47-3705 (“JP ‘705”), EP published application EP 0 295 727 A3 (“EP ‘727”), and Japanese Published Application Hei 4-145 182 (“JP ‘182”) properly combinable to support a rejection under 35 U.S.C. § 103(a) in the absence of clear and particular evidence of motivation to combine?

Applicant answers: No.

Issue B: Assuming, *arguendo*, that there exists clear and particular evidence of motivation to combine *JP '705*, *EP 727*, and *JP '182*, do the references create *prima facie* obviousness, when the references teach away from each other in material respects?

Applicant answers: No.

Issue C: Assuming, *arguendo*, that there is motivation to combine *JP '705*, *EP '727*, and *JP '182*, and assuming further, that their combination creates a *prima facie* case of obviousness, is the claimed invention obvious over the references due to their complete silence with respect to salient claim limitations, their failure to direct the skilled artisan to the claimed invention, and their teachings away from the claimed invention when the references are considered as a whole?

Appellants answer: No.

## **VII. GROUPING OF CLAIMS**

For the purposes of this appeal, with respect to the relevant claims in each of the rejections, the claims stand or fall together.

## **VIII. ARGUMENT**

There are three rejections of record:

- 1) Rejection of claims 1-8 and 11-18 under 35 U.S.C. § 103 over *JP '705* in view of *EP '727*;
- 2) Rejection of claims 1-19 under 35 U.S.C. § 103(a) over *JP '705* in view of *EP '727* further with *JP '182*;
- 3) Rejection of claim 19 under 35 U.S.C. § 103(a) over *JP '705* in view of *EP '727*, further in view of *JP '182* and further in view of “applicants’ admissions.”

Appellants solicit the reversal of all three rejections.

a) The Claimed Invention

The present invention is directed to aqueous polymer dispersions useful as low emissions tile adhesives, and water redispersible powders prepared therefrom. The polymer particles are copolymers prepared from ethylene; a vinyl ester whose homopolymer has a  $T_g > 0$ , e.g. vinyl acetate; a branched vinyl ester of 8 - 13 carbon atoms whose homopolymer has a  $T_g < 0$ , e.g. VeoVa10; and an unsaturated mono- or dicarboxylic acid. The copolymers are free of alkyl acrylates, and have a  $T_g$  in the range of  $-60^{\circ}\text{C}$  to  $-10^{\circ}\text{C}$ .

Aqueous tile adhesive dispersions cannot be satisfactorily prepared from vinyl acetate and ethylene alone, as these copolymers ("EVA" copolymers) do not possess the required tack. In the past, therefore, alkylacrylates such as n-butylacrylate or 2-ethylhexylacrylate were copolymerized with ethylene and vinyl acetate. However, the alkyl ester side groups contained in the copolymer are subject to hydrolysis, thus liberating the corresponding alkanol, i.e. n-butanol or 2-ethylhexanol, respectively, over time. Such alkanol emissions are toxicologically undesirable. See, e.g. page 1, line 31 to page 2, line 9, and the emission test results on page 15, line 25 to page 16, line 20.

Thus, the problem solved the invention was to prepare copolymers which exhibit the excellent tack and other physical properties of EVA/alkylacrylate copolymers without generating alkanol emissions. Applicants achieved this problem through incorporation of monomers from four distinct monomer classes: ethylene, vinyl esters whose homopolymer  $T_g$  is  $> 0$ , preferably vinyl acetate; branched  $\text{C}_{8-13}$  vinyl esters whose homopolymer  $T_g$  is  $< 0$ , preferably VeoVa®10 and/or VeoVa®11; and a small amount of an unsaturated mono-or dicarboxylic acid, preferably acrylic acid or methacrylic acid, importantly, in the absence of alkyl acrylates. In order to achieve the necessary degree of tack, the relative amounts of

comonomers must be adjusted to obtain a Tg of between -60°C and -10°C. The monomer proportions can be calculated beforehand using the Fox equation. *See*, e.g. page 5, lines 21-35. It is well known that the problem solved is highly relevant to the issue of patentability. *In re Shaffer*, 108 USPQ 326 (CCPA 1956). It is noted that none of the cited references even mentions the problem solved by Appellants.

b) The Teachings of the Cited References

With the exception of *JP 182*, the cited references are not directed to tile adhesives, but to paints (latex paints). *JP '182* is directed to tile adhesives, but not to aqueous adhesives containing dispersed polymer particles. Rather, *JP '182* is directed to the non-analogous field of solvent-borne tile adhesives where the polymers are dissolved in solvent. The properties of aqueous dispersion adhesives and solvent-borne adhesives are fundamentally different. The teachings of the three references may be summarized as follows:

1. *JP '705*:

*JP '705*<sup>1</sup> is directed to coating compositions (paints) which are aqueous emulsions (sic: dispersions) of copolymers of ethylene, vinyl acetate, and a vinyl ester of a tertiary aliphatic carboxylic acid, i.e. "latex paints." In *JP '705*, the problem to be solved was the preparation of latex paints exhibiting superior water resistance, elasticity, and flexibility over paints employing ethylene/vinyl acetate ("EVA") copolymers. This problem was solved by copolymerizing vinyl esters of tertiary carboxylic acids (Formula, page 3), where the total carbons represented by R<sup>1</sup>, R<sup>2</sup>, and R<sup>3</sup> are from 3 to 11. Thus, the smallest tertiary carboxylic acid is trimethylacetate (C<sub>5</sub>), used in Example 9 (Table, p. 13). Another tertiary carboxylic

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<sup>1</sup> The page numbers of both JP references as cited herein refer to page numbers of the English translations.

acid vinyl ester employed in the same table is vinyl-2,2-dimethylvalerate (Example 7). It is noted, again, that the problem to which *JP* '705 is directed bears no relation whatsoever to the problem addressed by Appellants.

A concern to the *JP* '705 inventors was a potential increase in surface adhesion (tack) in the polymer film (page 4, lines 8 - 12) and loss of adhesion to the substrate (page 4, lines 12 - 13). The *JP* '705 inventors indicate that amounts of vinyl tertiary carboxylates below 5% by weight increase tack, while amounts greater than 30% decrease substrate adhesion. It should be noted in this respect that the subject invention seeks to improve tack over EVA copolymers, while at the same time avoiding the use of alkylacrylates which had been used for this purpose.<sup>2</sup>

The coatings of *JP* '705 are clearly intended, and would be viewed as such by the skilled artisan, as having a relatively high Tg. The reason is, of course, that paints, when dry, should not be "sticky", otherwise dust and soil will adhere. Example 1 of *JP* '705 (Table 1, page 7) employs 30 pbw ethylene, 55 pbw vinyl acetate, and 15 pbw vinylneodecanoate.<sup>3,4</sup> It should be noted that the "tack" of this copolymer (first column, last row of continuation of the table, page 8) is listed as very low ("seldom recognized" in the translation). The Tg of this

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<sup>2</sup> Thus, *JP* '705 teaches that if vinyl tertiary carboxylates of any kind are used, if tack is to be increased, they should be used in amounts of less than 5% by weight. The subject claims require minimally 5% by weight, and preferably 10 - 45% by weight (claims 10, 12). *JP* '705 thus directs the skilled artisan away from the invention, even when the nature (Tg) of the vinyl tertiary carboxylate is ignored. *JP* '705 also teaches against increasing tack.

<sup>3</sup> The Applicants confirm that vinyl neodecanoate is identical or substantially identical to VeoVa 10.

<sup>4</sup> No unsaturated mono- or dicarboxylic acid comonomer is employed, nor is the use of such taught or suggested.

copolymer is not given, nor is there any teaching of copolymers having a Tg between -60°C and -10°C. *JP* '705 contains no teaching relative to polymer Tg, a salient claim limitation of Appellants' claims.

According to *JP* '705, addition of tertiary carboxylic acid vinyl esters can lower the tack if used in amounts of 5 weight percent or more. This appears to be supported by the *JP* '705 examples, where the Example 1 copolymer (15% VeoVa 10) had no noticeable tack, considerably less than a straight, high vinyl acetate content EVA copolymer (Comparative Example 4) and comparable to a polyvinyl acetate homopolymer (Comparative Example 1). It is known that EVA polymers do not have the required tack for aqueous tile adhesives, nor sufficient peel strength of cohesiveness. *See*, e.g. Table 1 on page 17, Comparative Examples C11 and C12.

*JP* '705 also does not distinguish from among the possible vinyl tertiary carboxylates: all are treated the same. In fact, two examples employ vinyl tertiary carboxylates whose homopolymers have  $T_g > 0$ : vinyl pivalate (vinyl trimethylacetate), homopolymer  $T_g$  86°C; and vinyl-2,2-dimethylvalerate, homopolymer  $T_g$  10°C. These *JP* '705 formulations merely contain two different, high  $T_g$  vinyl esters, i.e. vinyl acetate and vinyl pivalate, BOTH of which have homopolymer  $T_g > 0$ , and clearly do not meet the relevant claim limitations, which require vinyl esters with homopolymer  $T_g > 0$  AND vinyl esters with homopolymer  $T_g < 0$ .

Thus, summarizing the teachings of *JP* '705 as they would appear to one skilled in the art:



- 1) use of vinyl tertiary carboxylates of any kind, regardless of homopolymer Tg, in amounts greater than 5% lowers tack of the copolymer produced<sup>5</sup>;
- 2) low tack is desired, as the *JP '705* copolymers are for coating (paint) applications;
- 3) preparation of copolymers having a Tg in the range of -60°C to -10°C is not taught or suggested, rather the clear implication is that higher Tg (and thus low tack) are desired<sup>6</sup>;
- 4) use of unsaturated mono- or dicarboxylic acid comonomers for any purpose is neither disclosed nor suggested;
- 5) there is no reason to select any vinyl ester having a Tg < 0; the Tg of the vinyl ester is of no importance<sup>7</sup>;
- 6) no use of the copolymers as adhesives, particularly tile adhesives, is taught or suggested;
- 7) the problem solved is increasing water resistance, flexibility, and elasticity of coated films. There is no discussion of the problem solved by Appellants, maintaining or increasing tack while avoiding harmful emissions.

2. *JP '182*

*JP '182* is not directed to aqueous copolymer tile adhesive dispersions, nor to redispersible powder suitable therefor, but rather is directed to solvent-borne tile adhesives.

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<sup>5</sup> Appellants desire to increase tack.

<sup>6</sup> Appellants claims require a Tg in the range of -60° to -10°.

<sup>7</sup> Appellants require a vinyl ester with homopolymer Tg > 0 AND a vinyl ester with homopolymer Tg < 0; the presence of the latter is a salient claim feature.

These solvent-borne adhesives contain dissolved polymers, and are in no way similar to the aqueous dispersions or powders of the present invention. Applicants submit, therefore, that *JP '182* is not an analogous reference<sup>8</sup>.

The problem addressed by *JP '182* is provide solvent-borne tile adhesives which can perform like prior art adhesives which were asbestos-laden vinyl acetate/ethylene copolymers, vinyl acetate-VeoVa copolymers,<sup>9</sup> or vinyl acetate/VeoVa/acrylate copolymers. Due to environmental concerns with asbestos, asbestos was required to be removed from the compositions. However, the asbestos-free compositions were not suitable as solvent-borne tile adhesives. *JP '182* solved this problem in asbestos-free compositions by employing minimally two-component combinations of the above three distinct copolymers, as set forth below.

	Vinyl acetate/VeoVa Copolymer	Vinyl acetate/VeoVa/ Acrylate Copolymer	Vinyl acetate/ethylene Copolymer
Combination 1	<b>present</b>	absent	<b>present</b>
Combination 2	absent	<b>present</b>	<b>present</b>

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<sup>8</sup> As noted in *In re Clay*, 28 USPQ2d 1058 (Fed. Cir. 1992) paraphrasing, merely because both the subject invention and *JP '182* are directed to tile adhesives does not render them analogous. The general field of tile adhesives (*Clay*: petroleum storage) is broad, and solvent borne adhesives are very different from latex adhesives. The copolymers employed have very different requirements. For example, particles of dispersions must coalesce to form films, whereas dissolved polymers form films by molecular association upon evaporation of solvent. Moreover, as discussed later, the problems solved by *JP '182* is different from the problem solved by Applicants as well. Neither *Clay* criteria is met, and *JP '182* is not an analogous reference. See the discussion of *Clay* on page 15 herein.

<sup>9</sup> “Veoba” [sic: VeoVa] is not defined. It could be any tertiary carboxylic acid ester product. *JP '182* is therefore also non-enabling. A non-enabling reference cannot be used in formulating a rejection. *In re LeGrice*, 133 USPQ 365,372 (CCPA 1962); *In re Collins*, 174 U.S.P.Q. 333 (CCPA 1972).

Thus, in the adhesive solution, two distinct copolymers must be present, one of these always being an EVA copolymer (last column), and the other being either a vinyl acetate/VeoVa copolymer (first column), or a vinyl acetate/VeoVa/acrylate copolymer (middle column). It should be noted that the latter contains alkylacrylate residues, which the present invention specifically excludes, while the former includes no ethylene, as required by Appellants' claims. *JP '182* does not disclose any copolymer containing any unsaturated mono- or dicarboxylic acid. None of the disclosed copolymers meets Appellants' claim requirements. Nor do any of the disclosed copolymers meet the requirements of the other references.

Thus, one skilled in the art would view *JP '182* as teaching:

- 1) solvent-borne tile adhesives should be used, not aqueous dispersions or redispersible powders, thus teaching away from the subject invention aqueous dispersions;
- 2) tile adhesives require two distinct polymers, not one of which falls within the scope of Appellants' claims;
- 3) use of alkyl acrylates is acceptable in copolymers<sup>10</sup>;
- 4) copolymers of ethylene, a vinyl ester with a homopolymer  $T_g > 0$ , and a vinyl ester with a homopolymer  $T_g < 0$  are not disclosed;
- 5) use of unsaturated mono- or dicarboxylic acids is neither disclosed nor suggested;
- 6) the specification is non-enabling, as "VeoVa"<sup>11</sup> is nowhere defined.

### 3. EP '727

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<sup>10</sup> Avoiding use of alkyl acrylates is one of the problems solved by Appellants.

<sup>11</sup> "Veoba" in the translation

*EP* '727 is directed to aqueous lattices ("latexes" = polymer dispersions) for coatings (paints) which improve upon the properties of prior art dispersions employing copolymers of ethylene, vinyl acetate, and vinyl chloride or copolymers of ethylene and vinyl acetate. The lattices of *EP* '727 are prepared by copolymerizing ethylene, vinyl acetate, and a C<sub>9</sub> tertiary carboxylic acid vinyl ester whose homopolymer has a Tg in the range of 20°C to 120°C (page 2, lines 46 - 50). The copolymers may include 0.2 to 3% (based on polymer weight) of an internal stabilizer of copolymerized acrylic acid, an unsaturated monocarboxylic acid.

*EP* '727 specifically refers to *JP* '705, which is also directed to coating systems, and which has been previously discussed. *EP* '727 indicates that even though *JP* '705 states that use of VeoVa10 does not increase tack (see prior discussion of '705), the copolymers of '705 are still too tacky, despite the fact that no increase in tack is reported by *JP* '705, and tend to degrade in the presence of alkali. (Page 2, lines 32 - 37). Therefore, the *EP* '727 inventors specifically direct against use of VeoVa10<sup>12</sup>, and teaches employing VeoVa9 instead, a vinyl ester with a Tg > 0, and in the range of 20 - 120°C (actually about 60°C).

In Table 1, eleven inventive copolymers employing VeoVa9 are described, all "stabilized" with 0.5% by weight of acrylic acid. As can be seen from the table, all the copolymer Tgs are relatively high, the lowest being -7°C, while most are in the range of 10 - 12°C. All the copolymers are ethylene/vinyl acetate/VeoVa9 copolymers. In Table 2, comparative copolymers are prepared employing VeoVa10, as taught by *JP* '705. Once again, all Tgs are relatively high, ranging from 0°C to 16°C, with most being greater than 4°C.

Thus, one skilled in the art would find that *EP* '727 teaches the following:

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<sup>12</sup> VeoVa10 has a homopolymer Tg < 0 and is a preferred monomer of Appellants' invention. *EP* '727 teaches to not use this monomer.

- 1) VeoVa10 is to be avoided. Rather, a C<sub>9</sub> tertiary carboxylic ester having a homopolymer Tg in the range of 20 - 120°C is to be employed, thus teaching directly away from the claimed invention;
- 2) If further stabilization of the polymer is required other than that which may be achieved with surfactants, colloidal stabilizers, and the like, copolymerized acrylamide or acrylic acid may be employed.
- 3) the copolymer dispersions are aqueous lattices.

### **ISSUE A**

The Federal Circuit has spoken many times on the evidentiary requirements to support combination of references in a rejection under 35 USC § 103(a), and also on the prohibition of combining disclosures with disparate teachings.

In the case of *In re Anita Dembiczak* and *Benson Zinbarg*, 50 U.S.P.Q.2d 1614 (Fed. Cir. 1999), the CAFC has indicated that the requirement for showing the teaching or motivation to combine references is "rigorous." *Dembiczak* at 1617. Moreover, this showing, which is rigorously required, must be "clear and particular." *Dembiczak* at 1617. See also, *C.R. Bard v. M3 Sys., Inc.*, 48 U.S.P.Q.2d 1225, 1232 (Fed. Cir. 1998). It is well established that merely because references can be combined, the mere suitability for logical combination does not provide motivation for the combination. See, *Berghauser v. Dann, Comr. Pats.*, 204 U.S.P.Q. 398 (DCDC 1979); *ACS Hospital Systems, Inc. v. Montefiore Hospital*, 221 U.S.P.Q. 929 (Fed. Cir. 1984). Moreover, mere conclusory statements supporting the proposed combination, standing alone are not "evidence". *McElmurry v. Arkansas Power & Light Co.*, 27 U.S.P.Q.2d 1129, 1131 (Fed. Cir. 1993). See also *Ecolochem, Inc. v. Southern Cal. Edison Co.*, 56 USPQ2d 1065 (Fed. Cir. 2000); and in particular, *In re Lee*, 61 USPQ2d 1430 (Fed. Cir. 2002).

Here, the “evidence” of motivation to combine *JP* ‘705 with *EP* ‘727 is limited to the Examiner’s assertion that since *EP* ‘727 discloses acrylic acid as a potential internal stabilizer, that one would be motivated to add this stabilizer to the VeoVa10-containing copolymers of *JP* ‘705<sup>13</sup>. However, this “evidence” does not rise to the “clear and particular” level mandated by *Dembiczak*, and in fact is based on a false premise: that the copolymers of *JP* ‘705 or of the present invention require use of an internal stabilizer.

The copolymers of *JP* ‘705 were prepared with conventional surfactants as dispersion stabilizers. *JP* ‘705 does not indicate that there is any need for a stabilizer. Likewise, although the Appellants’ claims require a small amount of a low molecular weight mono-or dicarboxylic acid monomer such as acrylic acid, these acid monomers are not added for the purpose of stability, but rather to increase adhesion. Copolymers of otherwise identical composition to those claimed by Appellants, but devoid of carboxylic acid functional monomers, exhibit no stability problems, just as those of *JP* ‘705 did not.

One skilled in the art would only be motivated to employ an internal stabilizer if one were interested in stabilizing an unstable polymer. However, the polymers of *JP* ‘705 require no stabilization, and thus the premise on which motivation to combine is based is fundamentally flawed. It should also be noted that the claimed polymers are considerably different from the polymers of *EP* ‘727, which are high Tg and useful for latex paints, while the claimed polymers have low Tg and are used as tacky adhesives. Even if an internal stabilizer were required in *EP* ‘727’s high Tg copolymers, which *JP* ‘705 refutes, this would not mean that they would be necessary in Appellants’ polymers, which require a low Tg of -10

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<sup>13</sup> It is noted that only some of the copolymers of *JP* ‘705 employ a vinyl ester of tertiary carboxylic acid having a homopolymer Tg < 0, i.e. VeoVa10. Other polymers contain only vinyl esters with Tgs > 0, and there is no direction to employ those with Tg < 0 as opposed to those with Tg > 0.

to -60°C, a range neither taught nor suggested by *EP* '727. There is thus no evidence of record which meets the "clear and particular" mandate of the Federal Circuit.

There is also no clear and particular evidence supporting the combination of *JP* '182 with *JP* '105 or *EP* '727. *JP* '182 is not directed to the same field of endeavor (aqueous dispersion paints), nor is it directed to any problem solved either by the other two references or by the subject invention. *JP* '182 also fails to disclose any copolymer similar either to those of the subject invention or of *JP* '705 or *EP* '727.

*JP* '182 is thus a non-analogous reference under the standards set by *In re Clay*, 23 USPQ 1058 (Fed. Cir. 1992), and its forbears. In this line of cases, it has been well established that two criteria have evolved for determining whether prior art is analogous: (1) whether the art is from the same field of endeavor, regardless of the problem addressed, and (2) if the reference is not within the field of the inventor's endeavor, whether the reference still is reasonably pertinent to the particular problem with which the inventor is involved. *In re Deminski*, 796 F.2d 436, 442, 230 USPQ 313, 315 (Fed. Cir. 1986); *In re Wood*, 599 F.2d 1032, 1036, 202 USPQ 171, 174 (CCPA 1979). Here, the field of endeavors are different: *JP* '182, solvent borne tile adhesives; *JP* '705 and *EP* '727, aqueous latex paints. The problems solved are different as well: *JP* '182, maintaining tack while avoiding use of asbestos; *JP* '705, *EP* '727, formulating latex paints with improved flexibility, elasticity, water resistance (*JP* '705) and tack-free nature (*EP* '727).

Moreover, there is no evidence in the record of any motivation to combine *JP* '182 with the remaining references. *JP* '182 is directed to solvent borne, very tacky tile adhesives, while the remaining references are directed to non-tacky, aqueous latex paints.

There is no evidence supporting the combination of these references, much less evidence which meets *Dembiczak's* clear and particular evidentiary requirement.<sup>14</sup>

Furthermore, each of the references teaches away from the other references and/or the subject claims in at least one material respect. Under the prevailing case law, such references cannot be combined. *See, e.g. Karsten Manufacturing Corp. v. Cleveland Golf Co.*, 58 USPQ2d 1286 (Fed. Cir. 2001) (The “conflicting teachings” of two prior art references “can not reasonably be viewed as suggesting their combination into a [device] having the limitations set forth in” a patent’s claims). *See also*, in particular, *In re Grasselli*, 218 USPQ 769 (Fed. Cir. 1983).

*Grasselli* is discussed in the MPEP at § 2145(2) (p. 2100-157; Feb 2003, Rev. 1), and is particularly apt. In *Grasselli*, a multi-component, iron-containing phospho-molybdate catalyst was at issue. Claim 6 had been rejected over the combination of *Hiroki* in view of *Sennewald*. *Hiroki* disclosed all the catalyst components with the exception of iron, and further disclosed alkalizing the catalyst employing, *inter alia*, antimony.

*Sennewald* disclosed similar phospho-molybdate catalysts for the same utility, which, however, included iron, the component missing from *Hiroki*, and was cited by the Office for the “limited purpose” (secondary reference) of supplying this missing ingredient. However, while *Sennewald* disclosed addition of iron, he also recited that the catalyst should be free of antimony. In reversing the Board, the Federal Circuit indicated that *Hiroki* and *Sennewald* could not be combined, even for the limited purpose of the teaching of iron as a

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<sup>14</sup> The Examiner asserts ‘182 for the “limited purpose” of showing that the copolymers of *JP ‘705* and *EP ‘727* can be used as tile adhesives. However, one cannot simply pick an isolated disclosure from a reference. All the reference teachings must be considered, e.g. the use of solvent-borne adhesives rather than dispersions. More importantly, even the limited purpose for which *JP ‘182* is cited fails, because *JP ‘182* does not teach or suggest a single polymer like those of either of the references.



catalyst component, since *Hiroki* taught optional inclusion of antimony while *Sennewald* specifically negated its use.

These safeguards discussed above and others have been promulgated by the Courts to aid in a proper determination of the obviousness requirement of 35 U.S.C. § 103, i.e. whether the proposed combination would suggest itself to one of ordinary skill in the art so as to place the invention in the hands of the public. Applicants earnestly submit that the references applied to the present instance do not meet the tests for combination. In particular, one of the references, *JP '182* is not an analogous reference, and moreover teaches away from the claimed invention; and *JP '705* and *EP '727* cannot be combined, as their respective teachings are diametrically opposed, and the references are directed to a fundamentally different subject matter. Here, therefore, each of the references sought to combine clearly express teachings which conflict with the other references. Some of these conflicting teachings are set forth in the table below.

Claim Limitation	<i>JP '182</i>	<i>JP '705</i>	<i>EP '727</i>
aqueous dispersions	NO - solvent borne adhesives instead	yes	yes
EVA copolymer with tert. carboxylic acid vinyl ester having homopolymer Tg < 0	NO - use two completely different polymers instead	yes - one of several possibilities	NO - do not use
Employ VeoVa10 as comonomer	silent	one of several possibilities	NO - do not use; use VeoVa9 (homopolymer Tg ≈ 60°C instead)

As can be seen, each of the references conflicts with each of the others in at least one material way. Under the prevailing legal standards, none of the combinations of the references

proposed by the Examiner (*JP '705 with EP '727; JP '705 with EP '182 and with JP '182, and JP '705 with EP '727 with JP '182 and with “applicants’ admissions”*) are tenable under the law. The rejections of the claims must be reversed for those reasons.

## **ISSUE B**

The conditions necessary for establishing *prima facie* obviousness greatly reflect the latter portion of the discussion of Issue A. *Prima facie* obviousness is not created by the Examiner’s assertions of invalidity over one or more references, unless the Examiner’s choice of references and conclusions based thereon are sufficient to create *prima facie* obviousness under the law.<sup>15</sup> Two of the legal requirements for the establishment of *prima facie* obviousness are presence of motivation to combine references, and whether the references are legally combinable. Issue A spoke to the evidence which must be present in the record to suggest combination. In Issue B, it is the legal sufficiency of the “evidence,” assuming the latter exists, which is the issue.

It is well established that references cannot be combined without motivation to combine. *See, e.g. In re Regel*, 188 USPQ 136, 140 (CCPA 1975):

[t]here must be some logical reason apparent from positive, concrete evidence of record which justifies a combination of primary and secondary references

*In re Imperato*, 179 USPQ 730, 732 (CCPA 1973):

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<sup>15</sup> For example, *prima facie* obviousness over two references is not established when one of the references is not prior art to the application, or is a non-analogous reference.

[t]he mere fact that those disclosures can be combined does not make the combination obvious unless the art also contains something to suggest the desirability of the combination.

*See also, Northern Telecom, Inc. v. Datapoint Corp.*, 15 USPQ2d 1321, 1323 (Fed. Cir. 1990), *cert. denied*, 498 US 920 (1990):

It is insufficient that the prior art disclosed the components of the patented device, either separately, or used in other combinations (emphasis added); there must be some teaching, suggestion, or incentive to make the combination made by the inventor.

Appellants fail to find motivation to combine these references. The combination of *JP '705* and *EP '727* is said to be premised on the addition of the *EP '727* stabilizer to the *JP '705* polymers. However, there is no disclosure in *JP '705* which begs the use of a stabilizer. Why would one stabilize a polymer not in need of stabilization? One does not add new monomers to complex polymerizations indiscriminately when they are not needed. Why not add a vinyl aromatic monomer or some other monomer as well? *JP '705* does not cry out for any of these as well. Nor does *EP '727* suggest the use of the stabilizers generally. They are, first of all, optional in the *EP '727* process. However, the polymers of *EP '727* all are of high Tg, whereas the subject invention polymers are of low Tg. There is no suggestion that polymers other than those disclosed by *EP '727*, i.e. high Tg polymers, should employ an internal stabilizer. There is also no disclosure of any Tg of any polymer in *JP '705*. Where is the motivation to combine?

With respect to *JP '182* and either of the other references, the polymers of *JP '182* are very different. As discussed previously (pages 10-12), *JP '182* teaches that distinct polymers (in lieu of a single terpolymer) should be employed in solvent borne tile adhesives. Two combinations are proposed. In the first, a vinylacetate/VeoVa copolymer (VeoVa is not identified) is used in conjunction with a vinyl acetate ethylene (EVA) copolymer. Note that

no terpolymer of ethylene, vinyl/acetate, and any “VeoVa” termonomer is present. In the second combination, a vinyl acetate/“VeoVa”/acrylate terpolymer is employed with an ethylene/vinyl acetate copolymer. Note again that no terpolymer of ethylene, vinyl acetate, and any “VeoVa” termonomer is present.

*JP ‘182* is directed to tacky tile adhesives. *JP ‘705* and *EP ‘727* are directed to paints, which are aqueous dispersions. One cannot imagine painting a wall with a tile adhesive, and similarly, one would not expect an aqueous latex paint to be useful as a tile adhesive. Where is the motivation to combine *JP ‘182* with either *JP ‘705* or *EP ‘727*?

Most importantly, the law is quite clear that hindsight reconstruction cannot be used to piece together a quilt of Applicants’ invention. *See, e.g. In re Wesslau*, 147 USPQ 391 (CCPA 1965); *In re Fritch*, (1992) 23 USPQ2d 1780 (Fed. Cir.) (“One cannot use hindsight reconstruction to pick and choose among isolated disclosures in the prior art to deprecate the claimed invention.”) The law is also clear that references which teach against their combination in any material respect cannot be combined to support a rejection under 35 USC § 103. *See, e.g. McGinley v. Franklin Sports*, 60 USPQ2d 1001 (Fed. Cir. 2001) (We have noted . . . , as a ‘useful general rule,’ that references that teach away cannot serve to create a prima facie case of obviousness.”); and *In re Haruna*, 58 USPQ2d 1517 (Fed. Cir. 2001) (A prima facie case of obviousness can be rebutted if the applicant . . . can show “that the art in any material respect taught away” from the claimed invention.).

In view of the well documented conflicting teachings, Appellants assert that *prima facie* obviousness does not exist. Note particularly, for example, that *EP ‘727* specifically discusses *JP ‘705* (page 2, lines 33-37). However, rather than suggest the desirability of combination, *EP ‘727* indicates clearly and unambiguously that the terpolymers of *JP ‘705* should not be used. How can this teaching away be ignored, and the references

combined? For these reasons, Appellants submit that the rejections of the claims under 35 USC § 103, whatever their alleged combinatorial basis, be reversed.

### ISSUE C

Even if there were evidence of motivation to combine the references, even were the references combinable, and even if the combination somehow raised a *prima facie* case of obviousness, a review of the references disparate teachings clearly rebuts any *prima facie* case. Any *prima facie* case, were one to exist, is rebutted for at least two reasons: 1) under the law, a showing that the references teach away in material respects is sufficient to rebut a *prima facie* case; 2) the references, when considered as a whole, fail to teach or suggest the present invention.

As with Issue A and Issue B, the Federal Circuit and its predecessor courts have held that a reference which teaches away in any material respect is sufficient to rebut a case of *prima facie* obvious. See, e.g. *In re Peterson*, 65 USPQ2d 1379 (Fed. Cir. 2003):

an applicant may rebut a *prima facie* case of obviousness by showing that the prior art teaches away from the claimed invention in any material respect. *In re Malagari*, 182 USPQ 549, 553 citing *In re Geisler*, 43 USPQ2d 1362, 1365.

*McGinley v. Franklin Sports*, 60 USPQ2d 1001 (Fed. Cir. 2001):

We have noted . . . , as a ‘useful general rule,’ that references that teach away cannot serve to create a *prima facie* case of obviousness.” If an inventor takes steps that the prior art suggests cannot be made, it is probative of non-obviousness.

*Yamanouchi Pharmaceutical Co. v. Dunbury Pharmacal, Inc.*, 15 F. Supp.2d 366, 374 (S.D.N.Y. 1988), *aff’d* 56 USPQ2d 1641 (Fed. Cir. 2000):

If an inventor takes steps that the prior art suggests cannot be made, it is probative of non-obviousness.

*In re Haruna*, 58 USPQ2d 1517 (Fed. Cir. 2001):

A prima facie case of obviousness can be rebutted if the applicant . . . can show “that the art in any material respect taught away” from the claimed invention.

*Tec Air, Inc. v. Denso Mfg. Mich., Inc.*, 52 USPQ2d 1294, 1298 (Fed. Cir. 1999):

A reference may be said to teach away when a person of ordinary skill, upon reading the reference, . . . would be led in a direction divergent from the path that was taken by the applicant.

*JP '182* teaches solvent borne adhesives rather than aqueous paints. *JP '182* also teaches the use of combinations of polymers, none of which is similar to either the claimed polymers nor those of *JP '705* or *EP '727*. These features are salient features of *JP '182*. They are clearly material. *JP '182* therefore clearly cannot be combined with the other references.

*EP '727* teaches that VeoVa10, the termonomer employed by *JP '705* and one of those preferred in the claimed invention, should NOT be used. Rather, *EP '727* teaches that VeoVa9, a termonomer not employed in *JP '705*, and which does not meet Appellants' claim limitation of having a homopolymer Tg < 0 (VeoVa9's homopolymer Tg is ca. 60°C) should be used instead. The use of a tertiary carboxylic acid vinyl ester having a Tg below 0°C is a salient and material claim limitation. *EP '727* teaches against use of such vinyl esters by

requiring the use of VeoVa9, a vinyl ester which fails to meet the claim limitations. Thus, *EP* '727 also teaches away, and cannot be combined with *JP* '705 nor *JP* '182.

Since the two secondary references teach away in at least one material respect, as Appellants have abundantly shown, these references cannot be combined with *JP* '705 in a rejection under 35 USC § 103, and if combined, any *prima facie* case is clearly rebutted. The rejections of record must be reversed for these reasons.

However, the proposed combination of references, even were it proper, completely fails to teach or suggest the claimed application. Only by impermissibly picking and choosing, forbidden by cases such as *In re Wesslau, op. cit.*, could the invention be derived at, and then only by using Appellants' disclosure as a blueprint.

It is well established that the problem solved is highly material to patentability. *In re Shaffer*, 108 USPQ 326 (CCPA 1956). After all, inventions are not made in an intellectual or commercial vacuum. It is the purpose of the patent system "to promote the useful arts." While some inventions or discoveries may be purely serendipitous, e.g. Fleming's discovery of penicillin, most inventions are made purposefully to solve a problem. When such is the case, our case law is quite clear that a reference which does not even discuss the problem addressed and solved cannot suggest a solution. *See, e.g. In re Shaffer, op. cit.*

In this case, none of the references: neither the primary nor the two secondary references even remotely mentions the problem solved by Appellants; providing an aqueous tile adhesive which avoids alkylacrylate monomers in the preparation of the dispersion polymer, and thus the VOC emissions caused by subsequent hydrolysis of the ester linkages, without decreasing tack. None of the references discuss emissions at all, and none suggest avoiding alkylacrylates as comonomers. *JP* '182 actually encourages use of alkylacrylates as monomers. Since none of the references sought to address the problem addressed by

Appellants, how can it be said that they provided a solution? A combination of such references cannot be non-obviousness-defeating. *Shaffer, op. cit.*

The Examiner's position is that one would add the acrylic acid of *EP '727* to the polymers of *JP '705* for a different purpose: to stabilize the *JP '705* polymers. However, as indicated previously, there is no teaching or suggestion that the polymers of *JP '705* are in need of stabilization. So why would one attempt to stabilize them?

The attempt on the part of the Office to isolate a single feature of the secondary reference and insert it bodily into the primary reference is contrary to law. First, as discussed previously, there is no motivation to do so, since there is no evidence of record of any instability of the *JP '705* polymers. However, this "picking and choosing" is manifestly improper. The teachings of the references must be viewed as a whole, not in isolation. See, e.g. *In re Fritch*, (1992) 23 USPQ2d 1780 (Fed. Cir.) (one cannot use hindsight reconstruction to pick and choose among isolated disclosures in the prior art to deprecate the claimed invention); *In re Ehrreich*, 200 USPQ 504 509-10 (CCPA 1979) (question in a § 103 case is what the references would collectively suggest.) *In re Wood*, 202 USPQ 71 (CCPA 1979): (The test for obviousness is not whether the features of one reference may be bodily incorporated into another reference . . . . Rather, we look to see whether combined teachings render the claimed invention obvious (emphasis in original). Accord, *In re Keller*, 208 USPQ 871, 881 (CCPA 1981); *Ashland Oil, Inc. v. Delta Resins & Refractories, Inc.*, 776 F.2d 281, 295 (Fed. Cir. 1985) (reference must be considered for all it teaches, including disclosures which teach away from the invention) (emphasis added). *Panduit Corp. v. Dennison Mfg. Co.*, 227 USPQ 337 (Fed. Cir. 1985). On remand: 1 USPQ2d 1593 (Fed. Cir. 1987) (*cert. denied* 481 US 1052 (1987): (Each prior art reference must be evaluated as an entirety, and . . . all of the prior art must be considered as a whole.)



When viewing the references as a whole, rather than in isolation, a different picture emerges. Salient features of the individual references must be retained in the proposed combination, as well as salient teachings away. When the references are considered as a whole, what would the combinations suggest to one skilled in the art desirous of lowering emissions and maintaining tack? The answer, first and foremost, is: NOTHING. The references do not discuss the problem and do not suggest a solution.

Second, what if one were not looking to the solution of any particular problem: what would the references then teach with respect to simply combining their teachings for no apparent purpose? *JP '705* and *EP '727* would teach an aqueous dispersion of a terpolymer of ethylene (taught by both), vinyl acetate (taught by both), and VeoVa9 (not specified by *JP '705* which shows no preference for any particular tertiary carboxylic acid vinyl ester; required by *EP '727*). The resulting terpolymer is NOT within the scope of Appellants' claims (no tertiary carboxylic acid vinyl ester with homopolymer  $T_g < 0^\circ\text{C}$ ). The combination also would NOT teach inclusion of acrylic acid (mono- or dicarboxylic acid; Appellants' component (d)), unless the resulting polymer without acrylic acid were unstable. Neither reference would teach absence of alkylacrylates; both are silent in this respect.

What would *JP '182* add to the mix? *JP '182* requires totally different polymers, and in a solvent-borne composition. *JP '182* also teaches that alkyl acrylates can be used. Appellants are simply at a loss as to how these teachings can be combined with those of *JP '705* and *EP '727* just recited. The latter are aqueous dispersions; *JP '182* teaches solvent-borne adhesives. Both teachings are salient. They are also incompatible. No combination is possible.

With respect to freedom from alkyl acrylates, one of the polymer combinations employed by *JP '182* employs alkyl acrylates. Thus, *JP '182* cannot provide the motivation to avoid alkyl acrylates. Neither of the other references supplies this claim limitation either.

Claim 19 has been rejected over *JP '705*, *EP '727*, and *JP '182* in view of “Applicants’ admitted prior art.” As previously discussed, the three prior art references are not combinable. Applicants are also unaware of any “admission” which can be combined with the three prior art references to render the subject invention obvious. It is true that tile adhesives have been employed on cementitious, alkaline surfaces. However, none of the prior art suggests that elimination of acrylates as copolymerizable monomers will avoid alkanol emissions. As a matter of fact, *JP '182* clearly teaches the combination of an ethylene/vinylcarboxylate/acrylate polymer with an EVA copolymer. The former will produce alkanol emissions when employed on an alkaline substrate. Neither of the other references teaches or suggests avoiding acrylates. Acrylates are common ingredients in polymer dispersions, and previously have been necessary ingredients in tile adhesives based on aqueous polymer dispersions. *EP '727* specifically “allows” other comonomers. *JP '705* discloses no use of monomers other than ethylene, vinyl acetate, and vinyl tertiary carboxylates. However, *JP '705* is not directed to tile adhesives (nor is *EP '727*) where cementitious substrates are to be at least sometimes expected. The polymers improved upon by *JP '705* are EVA polymers, not EVA/acrylate polymers. Thus the combination of references fails to direct the skilled artisan to the claimed invention. Withdrawal of the rejection of claim 19 is solicited for these additional reasons.

### Summary

There is no evidence of record which meets the clear and particular mandate of *In re Dembiczak* and its progeny to support combination of the references. The proposed “motivation” suggested by the Office is a false premise for which there is no teaching or suggestion in the art.

The references cannot be combined due to their disparate teachings, each of which teaches away from the others in at least one material respect. One reference, *JP '182*,

is not even an analogous reference, and cannot be combined for this reason alone. In fact, the secondary reference *EP '727* teaches against its combination with the primary reference. The references cannot be combined, and *prima facie* obviousness has not been established.

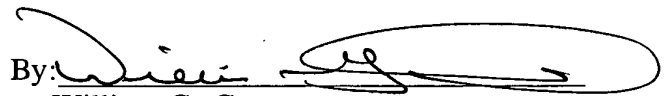
Even were there evidence to combine, even were the references combinable, and even were *prima facie* obviousness, assuming it existed, not rebutted by the fact of disparity alone, the references must be considered as a whole, and when combined, their salient teachings, including those which teach away from the subject invention, cannot be ignored. Under such an analysis, the subject invention is clearly non-obvious. Not only do the references fail to even mention the problems solved by Appellants, and thus fail to suggest a solution, but moreover, the combination, when the references are taken as a whole, fail to suggest the claimed composition, whether the problem solved is considered or the various compositions are merely combined, disregarding the problem solved.

The claims are clearly patentable. Reversal of all rejections of records is solicited.

The fee of \$320.00 as applicable under the provisions of 37 C.F.R. § 1.17(c) is enclosed. Please charge any additional fee or credit any overpayment in connection with this filing to our Deposit Account No. 02-3978. A duplicate of this notice is enclosed for this purpose.

Respectfully submitted,

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Enclosure - Appendix

## **IX. APPENDIX - CLAIMS ON APPEAL**

1. A low-emission adhesive comprising an aqueous, protective-colloid-free polymer dispersion or water-redispersible dispersion powder prepared therefrom, of vinyl ester-ethylene copolymers containing free carboxylic acid groups, obtained by free-radically initiated emulsion polymerization, in aqueous medium and in the presence of at least one emulsifier, of a comonomer mixture comprising

- a) from 5 to 50% by weight of ethylene,
- b) from 20 to 80% by weight of at least one vinyl ester selected from the group consisting of vinyl esters of unbranched or branched carboxylic acids having 1 to 9 carbon atoms whose homopolymers have a glass transition temperature  $T_g > 0^{\circ}\text{C}$ ,
- c) from 5 to 70% by weight of at least one vinyl ester selected from the group consisting of a vinyl ester of a branched carboxylic acids having 8 to 13 carbon atoms whose homopolymers have a glass transition temperature  $T_g < 0^{\circ}\text{C}$ ,
- d) from 0.5 to 10% by weight of at least one ethylenically unsaturated monocarboxylic or dicarboxylic acid having 3 or 4 carbon atoms,
- e) from 0 to 10% by weight of at least one ethylenically unsaturated, hydroxyalkyl-functional comonomer,
- f) from 0 to 10% by weight of a further mono- or polyethylenically unsaturated comonomer,

the % by weight being based in each case on the overall weight of the comonomers and adding up to 100% by weight, and the dispersion obtained therewith optionally being dried wherein said vinyl ester-ethylene copolymers are free of moieties derived from (meth)acrylate alkyl esters, and wherein said copolymers have a glass transition temperature of between  $-60^{\circ}\text{C}$  and about  $-10^{\circ}\text{C}$ .

2. The low-emission adhesive as claimed in claim 1, wherein vinyl esters b) copolymerized are at least one member selected from the group consisting of vinyl acetate, vinyl propionate, vinyl butyrate, 1-methylvinyl acetate, vinyl pivalate, and vinyl esters of  $\alpha$ -branched monocarboxylic acids having 9 carbon atoms.

3. The low-emission adhesive as claimed in claim 1, wherein vinyl esters c) copolymerized are at least one member selected from the group consisting of vinyl 2-ethylhexanoate, vinyl esters of  $\alpha$ -branched monocarboxylic acids having 10 or 11 carbon atoms, and vinyl esters of branched monocarboxylic acids having 10 to 13 carbon atoms.

4. The low-emission adhesive as claimed in claim 1, wherein the copolymerized comonomer d) comprises at least one member selected from the group consisting of acrylic acid, methacrylic acid, itaconic acid, fumaric acid, and maleic acid.

5. The low-emission adhesive as claimed in claim 1, wherein the copolymerized comonomer e) comprises at least one member selected from the group consisting of methacrylic and acrylic hydroxyalkyl esters having a  $C_1$  to  $C_5$  alkyl radical.

6. The low-emission adhesive as claimed in claim 1, wherein copolymerized comonomer f) comprises at least one member selected from the group consisting of ethylenically unsaturated carboxamides, ethylenically unsaturated sulfonic acids and their salts, and vinylpyrrolidone.

7. The low-emission adhesive as claimed in claim 1, wherein said vinyl acetate-ethylene copolymer is a copolymer of a) from 10 to 40% by weight of ethylene, b) from 35 to 70% by weight of vinyl acetate, c) from 10 to 45% by weight of vinyl esters of  $\alpha$ -branched monocarboxylic acids having 10 or 11 carbon atoms, d) from 2 to 6% by weight of

acrylic acid and/or methacrylic acid, e) from 0 to 5 % by weight of hydroxyethyl acrylate, and f) from 0 to 2 % by weight of acrylamide.

8. A process of adhering a covering to a substrate which comprises applying to at least a portion of at least one of the covering and substrate surfaces, an adhesive-effective amount of the low-emission adhesive of claim 1, and contacting the surfaces of the covering and the substrate.

9. The process of claim 8 wherein the covering is flooring.

10. The process of claim 8 wherein the covering is a ceiling covering.

11. The vinyl ester-ethylene copolymer of claim 1 having free carboxylic acid groups derived from (meth)acrylic acid.

12. A low-emission adhesive based on an aqueous, protective-colloid-free polymer dispersion or water-redispersible dispersion powders, obtainable therefrom, of vinyl ester-ethylene copolymers containing free carboxylic acid groups, obtainable by free-radically initiated emulsion polymerization, in aqueous medium and in the presence of at least one emulsifier, of a comonomer mixture comprising

- a) from 10 to 40 weight percent ethylene;
- b) from 35 to 70 weight percent vinyl acetate;
- c) from 10 to 45 % of one or more vinyl esters of C<sub>10-11</sub> carboxylic acids having a Tg in their homopolymers of 0°C;
- d) from 2-6 weight percent of at least one of methacrylic acid or acrylic acid,

the % by weight being based in each case on the overall weight of the comonomers and adding up to 100 % by weight, and the dispersion obtained therewith being dried if desired, wherein

said vinyl ester-ethylene copolymers are free of moieties derived from (meth)acrylate alkyl esters and wherein said copolymers have a glass transition temperature of between -60°C and about -10°C.

13. A low-emission adhesive based on an aqueous, protective-colloid-free polymer dispersion or water-redispersible dispersion powders, obtainable therefrom, of vinyl ester-ethylene copolymers, obtainable by free-radically initiated emulsion polymerization, in aqueous medium and in the presence of at least one emulsifier, of a comonomer mixture consisting essentially of

- a) from 5 to 50% by weight of ethylene,
- b) from 20 to 80% by weight of at least one vinyl ester selected from the group consisting of vinyl esters of unbranched or branched carboxylic acids having 1 to 9 carbon atoms whose homopolymers have a glass transition temperature  $T_g > 0^\circ\text{C}$ ,
- c) from 5 to 70% by weight of at least one vinyl ester selected from the group consisting of a vinyl ester of a branched carboxylic acids having 8 to 13 carbon atoms whose homopolymers have a glass transition temperature  $T_g < 0^\circ\text{C}$ ,
- d) from 0.5 to 10% by weight of at least one ethylenically unsaturated monocarboxylic or dicarboxylic acid having 3 or 4 carbon atoms,
- e) from 0 to 10% by weight of at least one ethylenically unsaturated, hydroxyalkyl-functional comonomer,
- f) from 0 to 10% by weight of a further mono- or polyethylenically unsaturated comonomer,

the % by weight being based in each case on the overall weight of the comonomers and adding up to 100% by weight, and the dispersion obtained therewith being dried if desired wherein said vinyl ester-ethylene copolymers are free of moieties derived from (meth)acrylate alkyl esters, and wherein said copolymers have a glass transition temperature of between -60°C and about -10°C.



14. The vinyl ester-ethylene copolymer of claim 13, wherein said vinyl ester whose homopolymers have a glass transition temperature  $T_g > 0^\circ\text{C}$  are selected from the group consisting of vinyl acetate, vinyl propionate, vinyl butyrate, and mixtures thereof.

15. The vinyl ester-ethylene copolymer of claim 13, wherein said vinyl ester whose homopolymers have a glass transition temperature  $T_g < 0^\circ\text{C}$  are selected from the group consisting of vinyl esters of 2-ethylhexanoic acid,  $\alpha$ -branched monocarboxylic acids having 10 or 11 carbon atoms and vinyl esters of branched monocarboxylic acids having 10-13 carbon atoms, and mixtures thereof.

16. The vinyl ester-ethylene copolymer of claim 14, wherein said vinyl ester whose homopolymers have a glass transition temperature  $T_g < 0^\circ\text{C}$  are selected from the group consisting of vinyl esters of 2-ethylhexanoic acid,  $\alpha$ -branched monocarboxylic acids having 10 or 11 carbon atoms and vinyl esters of branched monocarboxylic acids having 10-13 carbon atoms, and mixtures thereof.

17. The adhesive of claim 1, wherein said ethylenically unsaturated monocarboxylic or dicarboxylic acid having 3 or 4 carbon atoms is present in said copolymer in an amount of from about 2 weight percent to about 6 weight percent based on the weight of said copolymer.

18. The adhesive of claim 13, wherein said ethylenically unsaturated monocarboxylic or dicarboxylic acid having 3 or 4 carbon atoms is present in said copolymer in an amount of from about 2 weight percent to about 6 weight percent based on the weight of said copolymer.

19. The process of claim 8 wherein said substrate is an alkaline, cementitious substrate.